

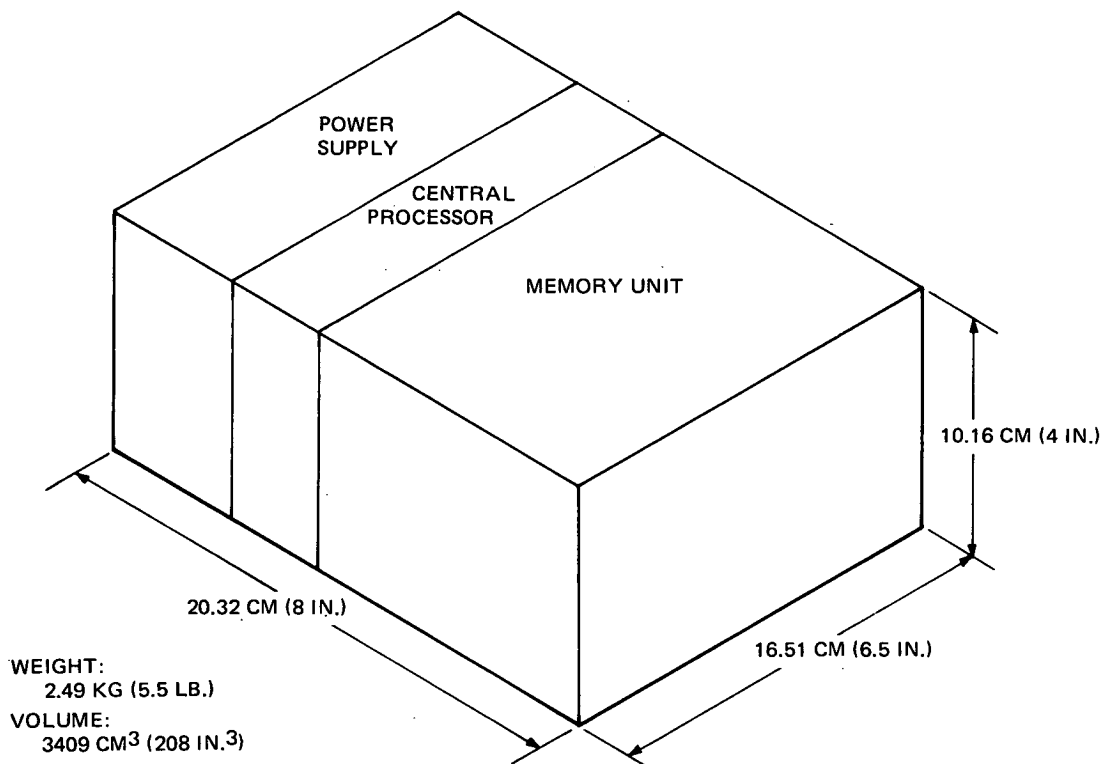
# NASA TECH BRIEF

## *Marshall Space Flight Center*



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### Flexible Desk Top Computers Using Large Scale Integrated (L.S.I.) Chips



#### The problem:

Currently many different types of L.S.I. chips are needed to build small general purpose computers.

#### The solution:

A flexible microprogrammable modular computer utilizing only seven different types of L.S.I. elements has been built. The result is a lower manufacturing cost and improved overall reliability.

#### How it's done:

It is found that seven types of L.S.I. chips can be standardized and by various interconnections, used to

implement variable bit length computers. The seven different elements and their functions are:

(1) **ARITHMETIC LOGIC UNIT** - performs the following: add, subtract, reverse subtract, 4-bit multiply, 2-bit divide, 2-bit square root, right and left shifts, and logic functions.

(2) **MULTIPLEXER REGISTER UNIT** - contains three multiplexers as well as temporary storage registers.

(3) **SCRATCH PAD MEMORY** - has program counter, accumulator, and index registers.

(4) **FLOATING POINT MULTIPLEXER UNIT** - contains the logic to provide floating point capability, if needed.

(continued overleaf)

(5) SEQUENCE CONTROL UNIT - provides the address capability for the ROM.

(6) READ ONLY MEMORY - provides the storage for the variable instruction set.

(7) FUNCTION CONTROL UNIT - has the logic associated with error detection and data control.

A typical 32-bit floating point computer with a cycle time of  $1\mu$  sec, direct and indirect addressing, and 16 general purpose registers would utilize 51 of these L.S.I. chips. Including main memory and power supplies, the configuration is as shown. The volume is 3409 cubic centimeters (208 cubic inches.).

**Note:**

Requests for further information may be directed to:

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Reference: B72-10112

**Patent Status:**

No patent action is contemplated by NASA.

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